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A consulting system for ER modeling instruction

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Background

Entity relationship modeling (Chen 1976) is a widely used methodology for conceptual database design. It involves modeling objects of interest as entities and the inter-relationships between them. Although the definitions of entities and relationships are simple to understand, students have difficulty choosing the right relationships from a description of the requirements. Consider the following case for example:

"¹We need to store information about Salesman, Order, Customers and Product are entities. ²An order is to keep track of what products a customer ordered for and a customer deals with an salesman to complete the order. ³However, for each order there is only one customer. ⁴A salesman may book orders for many products. ⁵An order may involve many products. ⁶A salesman may write many orders but an order is handled by only one salesman..."

A student learning ER modeling may be puzzled whether to model a 4-way relationship (sentence #2) or binary relationships (sentence #3, #5, #6) or a ternary relationship (sentence #4) or a combination of relationships. Ternary and 4-way relationships are not uncommon in business problems (e.g. Scheer 1989). To help the non-expert designer, Batra and Zanakakis (1994) have proposed a list of heuristics and rules for data modeling. If a designer follows those heuristics and rules he/she will find the data modeling process less difficult. The software system I propose to demonstrate is a knowledge based system and it has the heuristics and rules embedded in it.

CODA: The software

CODA was written in Visual Basic and runs under Windows 95. It was written for my dissertation. For my dissertation (Antony 1997) I empirically compared two implementations of the KB system with a non-KB system. It is being used as an instructional aid at Florida International University. The software will be made available to interested academics for free of cost.

Usage

The software can be used in classrooms for demonstration of ER modeling methodology as well for learning ER modeling concepts. Unlike most other data modeling

software, users can model ternary and 4-way relationships also. The System also helps in determining attributes of relationships. It can be programmed to automatically create logical design too.

The user can specify attribute names, entity names and then assign attributes to entities. Once all the entities are specified, the user can define relationships. The system advises the user of the specific sequence of relationships to be modeled. By following the sequence some of the errors would be prevented. The system helps the user in determining the cardinality of entities in a relationship too.

What will be covered

The demonstration will involve solving a complex data modeling problem. It will also include commentary on the common pitfalls of data modeling and how they can be avoided using the software. The instructional capability of the system will also be demonstrated with a number of 'what-if' scenarios.

Material to attendees

A copy of the software, sample problems and solutions and user manual.

Resources needed

I will need a PC with Windows 95 and a projection facility.

Short description of the demonstration

CODA (Conceptual Database design Assistant) is a knowledge based tool for data modeling. Users can develop Entity Relationship diagrams that have binary, ternary and 4-way relationships. Some of the commonly found errors in novice designs can be prevented by using this software. It assists in determination of cardinality of entities in relationships. The knowledge based tool has been empirically shown to improve data modeling performance of database designers. It runs under the Windows operating system.

References

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